Communication bridge Xcom-MS

User Manual

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Communication bridge Xcom-MS: User Manual

V1.0.1

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About the software

This document applies to the software version V1.4.0 or higher of the Xcom-MS. The software version number can be found using the menu "Information on the system". The latest software version is available to download from the Studer Innotec website: "www.studer-innotec.com/support".

Legal Notice

The use of Studer Innotec SA devices is the responsibility of the customer in all cases. Studer Innotec SA reserves the right to make any modification to the product without prior notice.

Product recycling

The Xcom-MS conforms to the European directive 2002/95/EC on hazardous substances and does not contain the following elements: lead, cadmium, mercury, hexavalent chrome, PBB or PBDE.

To dispose of this product, please use the service for the collection of electrical waste and observe all applicable obligations according to the place of purchase.

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1. Introduction

1.1. The communication bridge Xcom-MS

The communication bridge Xcom-MS makes it possible to integrate solar charge controllers from MorningStar, the MPPT TriStar, with an Xtender system. It enables:

- system monitoring of the solar charge controller on the RCC-02/-03
- adjustment of the solar charge controller parameters using the RCC-02/-03
- data logging of operating data on SD cards
- synchronization of solar charge controller cycles with the inverter-charger

1.2. Conventions

Symbols

This symbol is used to indicate the presence of a dangerous voltage that is sufficient to constitute a risk of electric shock.

This symbol is used to indicate a risk of material damage.

This symbol is used to indicate information that is important or which serves to optimize your system.

1.3. Warranty and liability

Warranty and liability

During production and assembly, each Xcom-MS undergoes several controls and tests. These are carried out in full respect of fixed procedures. Each Xcom-MS has a specific serial number allowing for a perfect follow-up of the controls, in conformity with the specific data of every device. For this reason, it is highly important to never remove the descriptive sticker bearing the serial number. The production, the assembly and the tests of each Xcom-MS are entirely carried out in our factory in Sion (CH). The warranty of this product depends upon the strict application of the instructions in this manual. The warranty period for the Xcom-MS is 5 years from the date of manufacture.

Disclaimer of warranty

No warranty will be granted for damages due to handling, operation or actions that are not described in this manual. Any damage caused by one of the following events is not covered by the warranty:

- Overvoltage on the device.
- Liquid in the device or oxydation due to condensation.
- Failures due to a fall or to a mechanical shock.
- Modifications made without the explicit authorization of Studer Innotec SA.
- Nuts or screws partially or insufficiently tightened during installation or maintenance.
- Damages due to atmospheric overvoltage (lightning).
- Damages due to transport or improper packaging.

- Loss of stickers or plates with origin marking.

Disclaimer of liability

Installation, commissionning, use and maintenance of this device can not be supervised by the company Studer Innotec SA. For this reason, we do not accept any liability for the damages, the costs or the losses generated either by an installation that is not conforming to the prescriptions, by a defectuous operation or by a poor maintenance. The use of this device is under the responsibility of the end-user. This device is neither designed nor guaranteed for the supply of life support applications or any other critical application with potential risks for human beings or for the environment. We shall assume no liability for patent infringement or other third party rights involved in the use of this device.

Compatibility

Studer Innotec SA guarantees the compatibility of the software updates with the hardware for one year, starting from the date of purchase. The updates are no longer guaranteed beyond this date and a hardware upgrade may be required. Please contact your reseller for any additional information on compatibility.

1.4. Safety precautions

Generalities

Do read carefully all safety instructions before proceeding with the installation and commissionning of the device. Not respecting these instructions might constitute a lethal physical danger but can also damage the functionnalities of the device. Therefore do keep this manual close to the device.

Strictly follow the local and national norms and regulations in force for any installation.

Warnings

- Wherever the installation, the person in charge of installation and commissionning must perfectly know the safety measures and the prescriptions in force in the country. Therefore, all maintenance must be carried out by a qualified staff.
- All components connected to this device must be conform to the laws and regulations in force. Persons without a written authorization from Studer Innotec SA are forbidden to do any change, modification or repair whatsoever. Regarding authorized modifications and replacements, only original components shall be used.
- This device is meant to be used indoors and must under no circumstances be exposed to rain, snow or any other humid or dusty environment.

2. EC declaration of conformity

The communication bridge Xcom-MS described in this manual meets the requirements specified in the following EC directives and norms:

- Low voltage directive 2006/95/EC: EN 60950:2005
- EMC directive 2004/108/EC: EN61000-6-1:2005 and EN61000-6-3:2006
- RoHS directive 2002/95/EC

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3. Dimensions

3.1. Views of different sides with dimensions

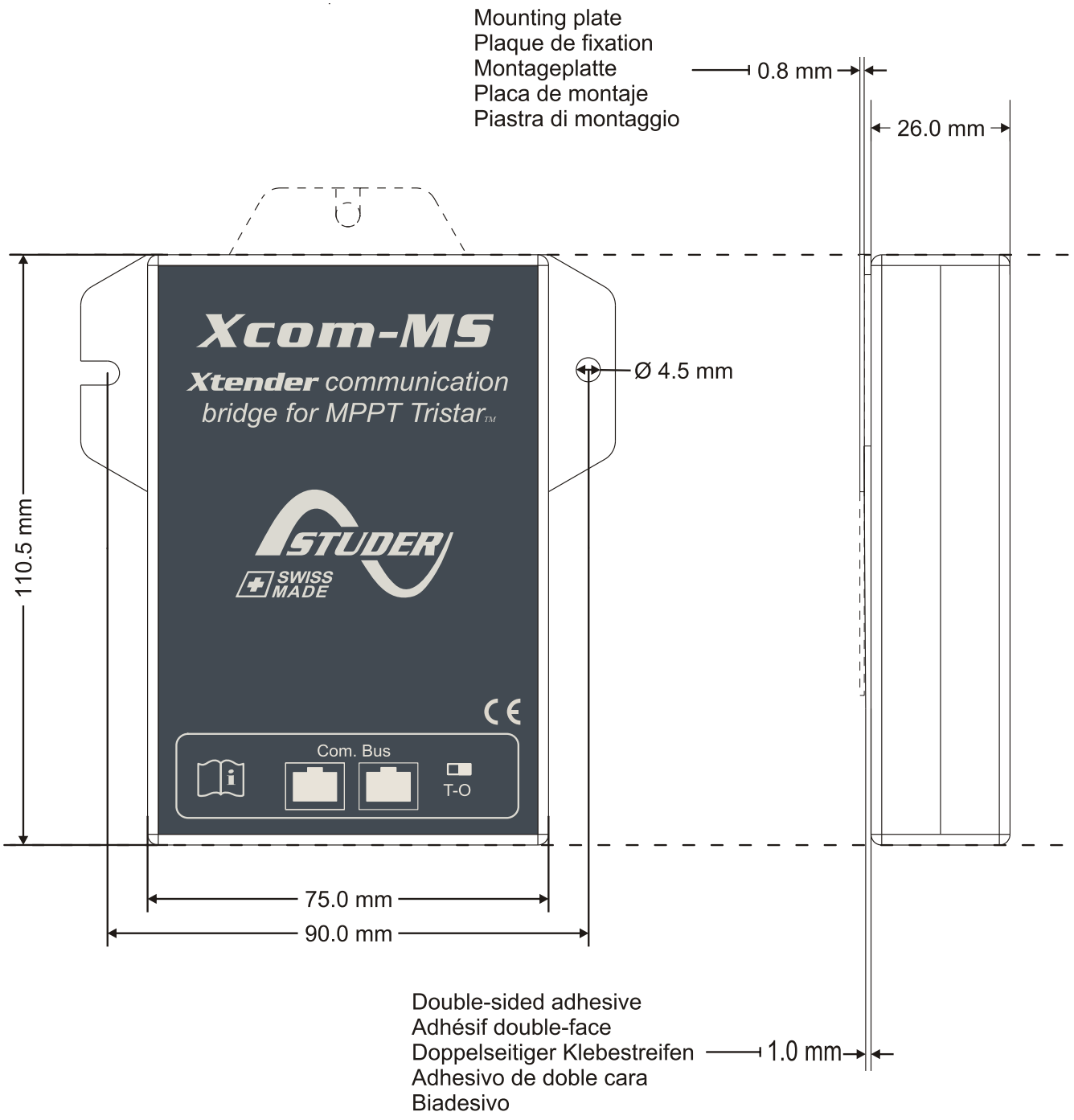


Figure 3.1. Views of different sides with dimensions

3.2. Exploded view

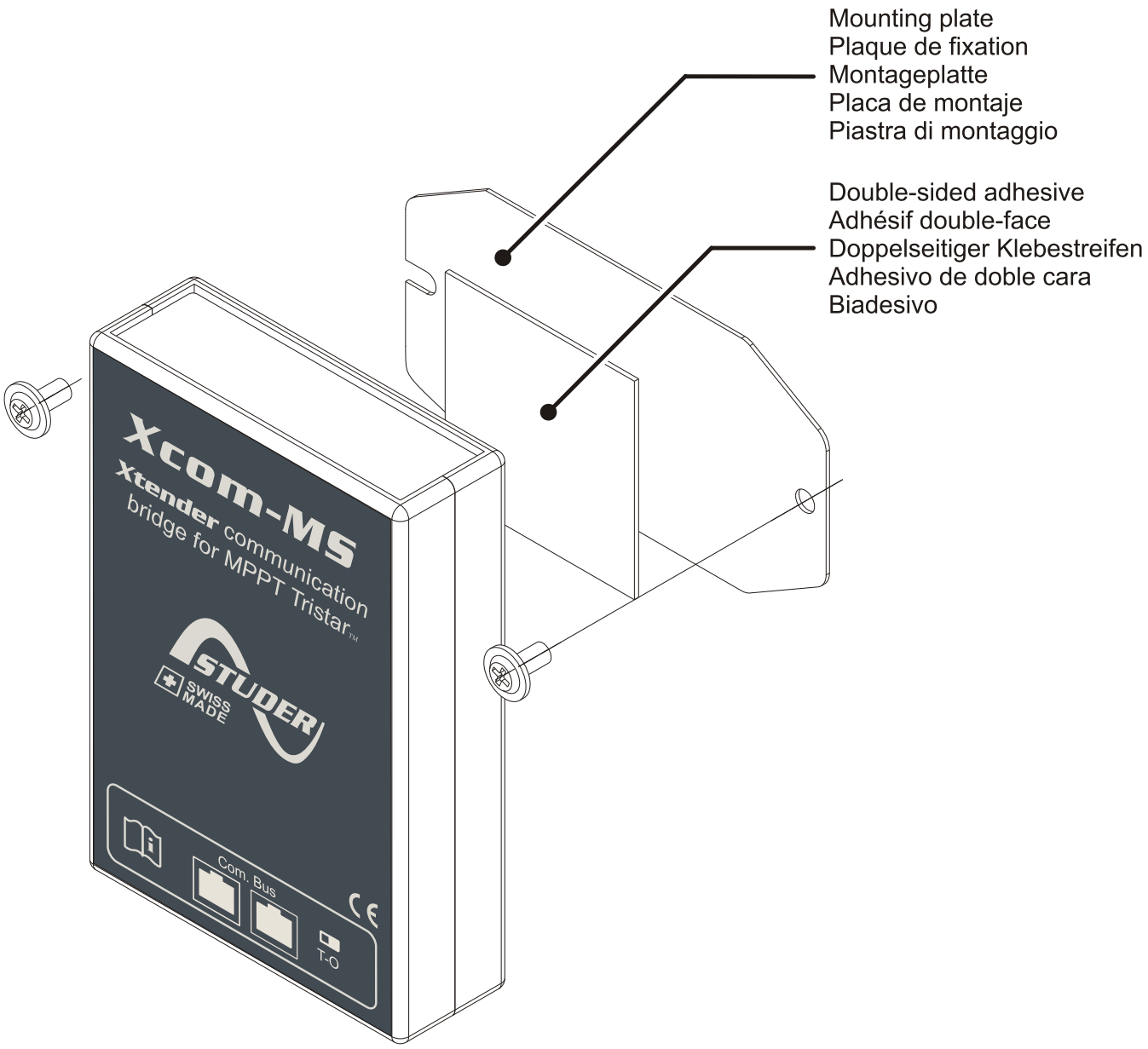


Figure 3.2. Exploded view

4. Installation

The Xcom-MS constitutes the interface between the Xtender communication bus and the MorningStar MPPT solar charge controller bus RS-485, as represented in figure 4.1. It is only possible to connect one Xcom-MS to each Xtender bus and 1 to 30 solar charge controllers on the RS-485 bus. It is recommended to use short RS-485 connections.

The solar charge controller TriStar MPPT-60 is equipped with a serial RS-485 port. The TriStar MPPT-45 model needs the MorningStar RSC-1 accessory in order to connect with the Xcom-MS.

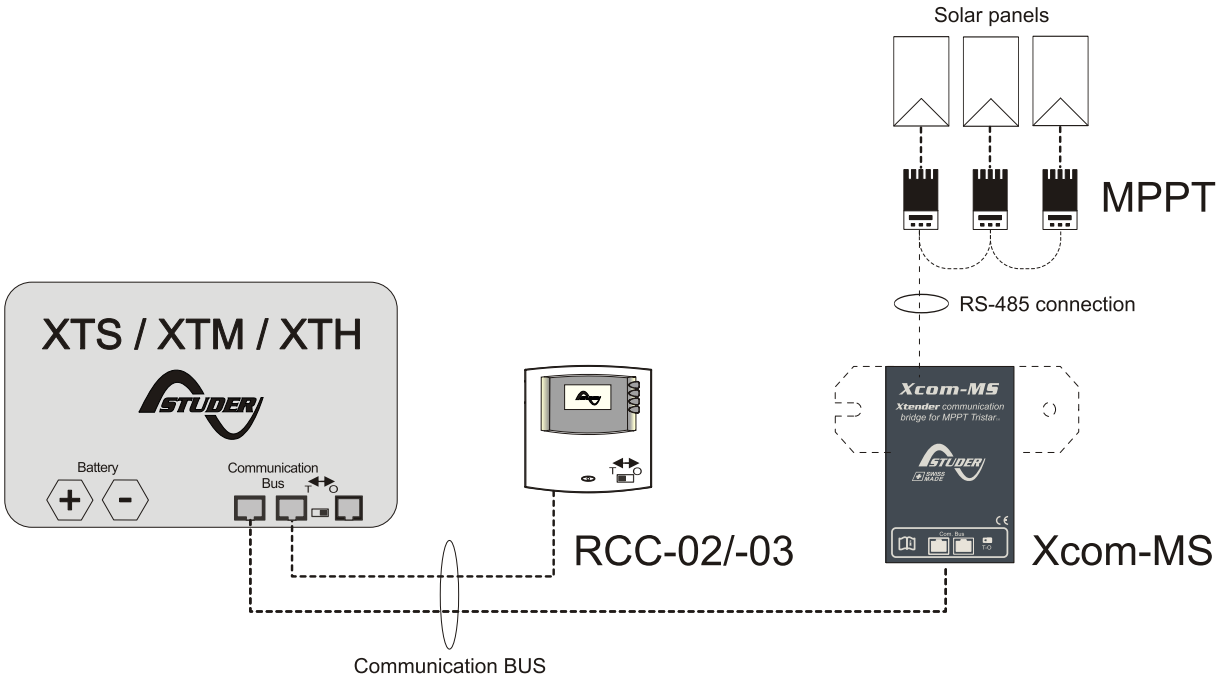


Figure 4.1. Connection schematics of the Xcom-MS

The installation includes three steps. Start by connecting the Xcom-MS with the Xtender communication bus according to the procedure explained in section 4.3. Secondly, assign one unique address to each solar charge controller on the RS-485 bus. This is done by connecting each solar charge controller separately to the Xcom-MS on the RS-485 bus. Using parameter {8002} the solar charge controller's identifier is set according to the procedure in section 4.4. When all solar charge controllers have been given an address, connect them to the RS-485 bus and the installation is finalized and ready to be used.

4.1. Mounting

The Xcom-MS can be mounted directly on any support by means of the supplied fixing plate or on a smooth surface with a double-sided adhesive (see figure 3.2).

4.2. Description of the front

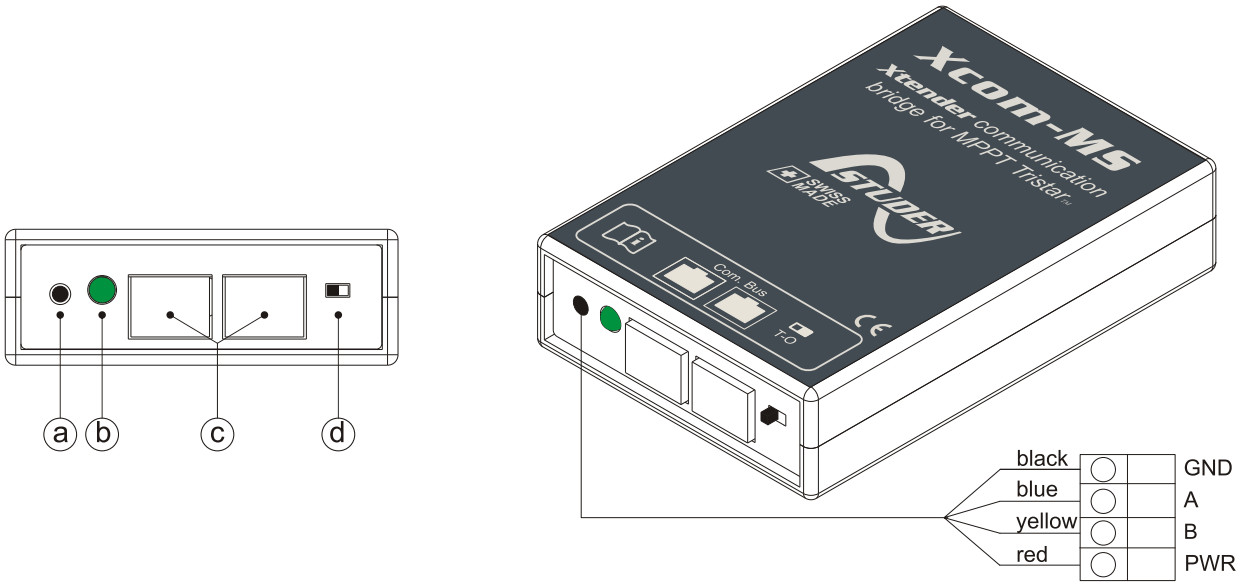


Figure 4.2. Front and isometric view of the Xcom-MS

Key	Description of the part	Description of the function
a	RS-485 cable	This cable connects the solar controllers with the RS-485 bus. The connection is done by serial bus. The wiring is as follows: • black wire: "GND" • blue wire: "A" • yellow wire: "B" • red wire: "+12V"
b	LED indicators	This LED flashes briefly every two seconds during normal operation.
c	Connectors for the Xtender communication bus	These connectors allows the Xcom-MS to connect to one or several Xtender.
d	Switch for termination of the Xtender communication bus	This switch turns on or off the termination of the communication bus. See section 4.3. The termination is by default activated.

4.3. Connecting the Xtender communication bus

The devices in the Xtender range are equipped with a proprietary communication bus for data exchange, configuration and updates of the system. The connection is made by linking the devices with the supplied communication cables. This results in a bus in line where the termination must be activated on the devices at both ends in order to obtain the configuration in figure 4.3.

Each device has a switch that allows to choose between open "O" or terminated "T". The devices at both ends of the line must be set to "T". The others, receiving two communication cables, must be set to "O".

By default, the termination is set to T (terminated) on each device.

If the teminations are not corretcly set it may lead to erratic behaviour of the installation or prevent it from updates.

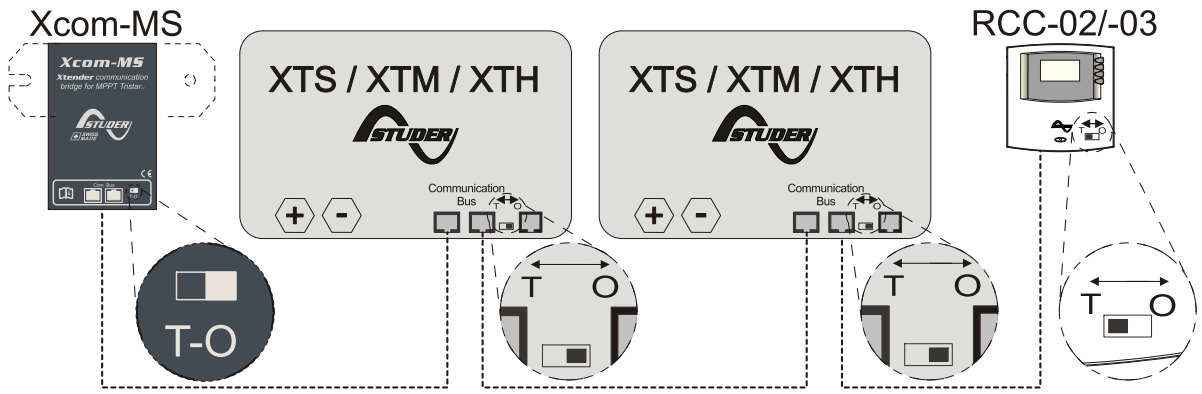


Figure 4.3. The communication bus in line in an Xtender system (example)

4.4. Assigning of RS-485 addresses

Unlike the Xtender communication bus which automatically assignes the addresses, these will have to be manually configured for all devices on the RS-485 bus. Begin by connecting the Xcom-MS with the Xtender bus and start the system. Thereafter each solar charge controller is separately connected to the RS-485 communication bus as described in figure 4.4.

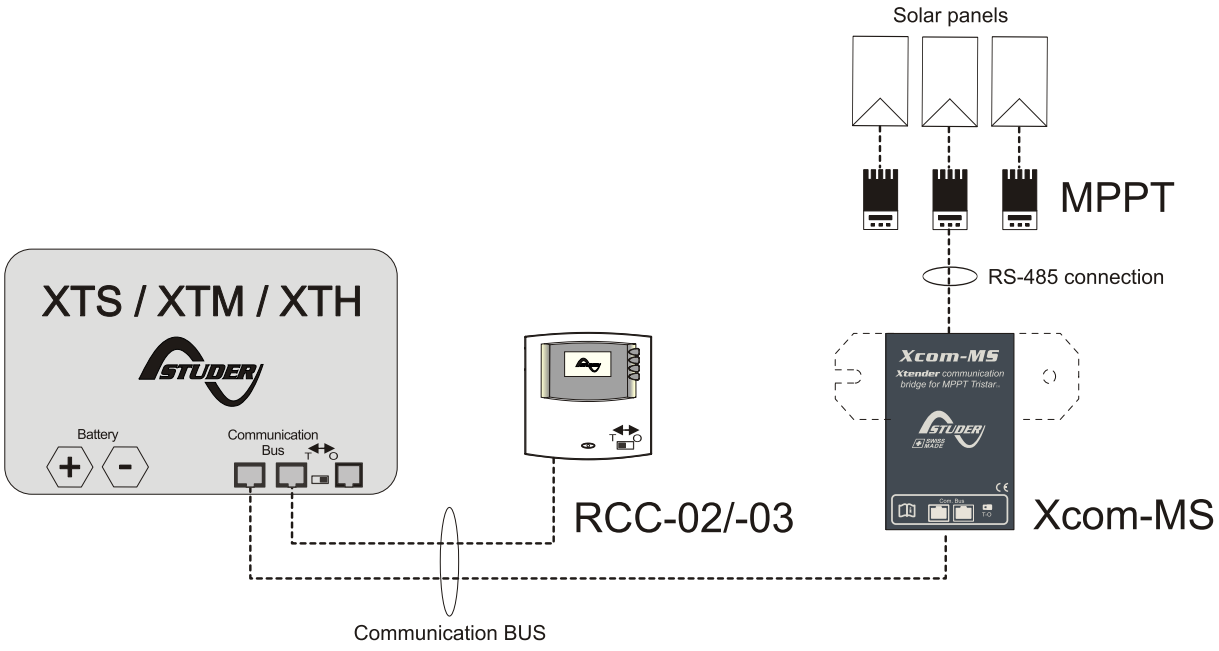
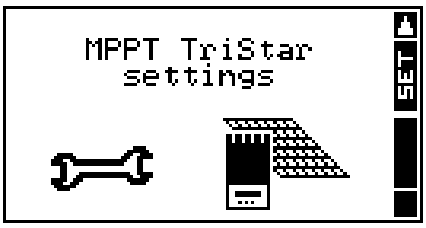


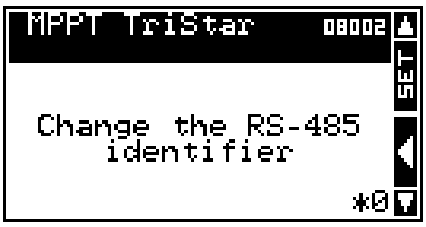
Figure 4.4. Connection for RS-485 address assignement

Start at the initial screen of the RCC-02/-03, use the buttons UP or DOWN to reach the configuration menu of the MPPT Tristar settings, and then press SET.

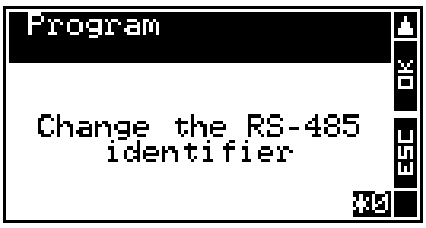


To modify the parameter "Change the RS-485 identifier {8002}", use the buttons UP or DOWN to reach the "BASIC SETTINGS" menu.

Press SET to enter the menu. Use the DOWN button to reach the parameter "Change the RS-485 identifier".



Press SET to change the value. The value will be displayed in inversed colours.



Use the UP and DOWN buttons to change the value into the correct address for the solar charge controller connected to the RS-485. Confirm the new value by pressing SET. Wait five seconds for the new address to be taken into account. If there is a problem with the new setting the screen of the RCC-02/-03 flashes red.

Disconnect the solar charge controller with a valid address and connect the next solar charge controller to the RS-485. The address assignations can continue without having to leave the menu.

Once all solar charge controllers have been assigned an address, they can be interconnected as in figure 4.1. To confirm that the right number of solar charge controllers have been detected, control the display value "Number of MPPT" (see table 5.1). The Xcom-MS is ready to use.

5. Xcom-MS features

5.1. Status indication displayed on the RCC-02/-03

In installations with an Xcom-MS, the remote control RCC-02/-03 has an additional view, showing performance data of the solar charge controllers, see figure 5.1. On this display four values can be indicated.

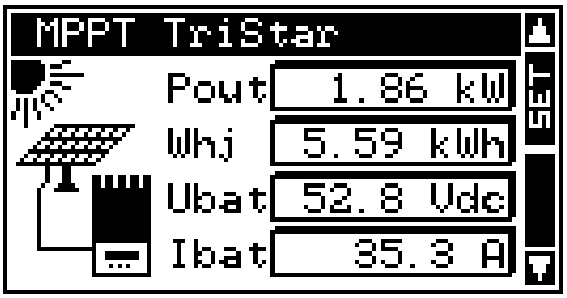


Figure 5.1. Status indication displayed on the RCC-02/-03

It is possible to select which values to display. When in the view represented in figure 5.1, press SET. The first field will then be selected. With the buttons UP and DOWN navigate to the field to configure. Use the button SET to enter the menu of available values to display.

Select the value to display with the buttons UP and DOWN and confirm the selection with SET.

Press ESC to return to the initial view at any time.

These are the available values:

Name of the value	Label	Unit	Description
Sum of output power	Pout	W	Power injected in the battery from all solar charge controllers
Daily quantity of energy	Whd	Wh	The energy produced by all solar charge controllers since midnight.
Average battery voltage	Ubat	Vdc	Battery voltage. This is an average of all the solar charge controllers' values as they may have small measuring differences.
Sum of battery currents	Ibat	A	Current injected into the battery from all solar charge controllers.
Daily quantity of power transfer	Ahd	Ah	Ah capacity injected by all solar charge controllers since midnight.
Number of MPPTs	nr	-	Number of MPPTs detected on the bus RS-485
Output power for the selected MPPT	Pou1	W	Power of the MPPT chosen in the setting {8014}. Only visible in EXPERT mode.
Daily energy of the chosen MPPT	Whd1	Wh	Energy from the MPPT chosen in the setting {8014}. Only visible in EXPERT mode.
Battery voltage of the chosen MPPT	Uba1	Vdc	Voltage measured by the MPPT chosen in the setting {8014}. Only visible in EXPERT mode.
Battery current of the chosen MPPT	Iba1	Adc	Current measured by the MPPT chosen in the setting {8014}. Only visible in EXPERT mode.
Voltage of the solar panels connected with the chosen MPPT	Usol	Vdc	Voltage of solar panels connected with the MPPT chosen in setting {8014}. Only visible in EXPERT mode.
Daily power transfer of the chosen MPPT	Ahd1	Ah	Power transfer since midnight by the MPPT chosen in the setting {8014}. Only visible in EXPERT mode.

Table 5.1. Available values for the MPPT TriStar view

5.2. Management of charge cycles

When the parameter {8001} "Charge cycles synchronization activated" is set to "Yes", the Xcom-MS receives the cycle voltage setpoint for the inverter-charger(s) from the Xtender communication bus. The Xcom-MS tranfers the information to the solar charge controllers using the RS-485. In case of failure of the inverter-chargers or loss of connection, the solar charge controllers return to independent mode using their own parameter set.

When the parameter {8001} is set to "No" the solar charge controllers use their own battery cycle which is synchronised with the parameter set in the Xcom-MS. This is the default behaviour.

The internal set of paramenters in the solar charge controllers is constantely being synchronised with the set of parameters of the Xcom-MS which can be found in the menu {8003} "Battery management without synchronization". These parameters can be modified using the RCC-02/-03. If a parameter is changed the synchronisation can take up to one minute and may generate a restart of the solar charge controllers.

The solar charge controller's DIP switches should be configured in "Custom" position (that is with 4,5,6 set to ON) in order for its internal parameter set to be taken into account. Otherwise the DIP configuration will be used.

6. Parameter settings

A complete list of available parameters can be found in chapter 8.

6.1. General information

The configuration is carried out on the RCC-02/-03 by means of the MPPT TriStar parameter menu.

6.2. User levels and accessibility

The functions described below are available at EXPERT level. Depending on the selected user level, all of these functions may not be accessible. Do refer to the chapter "RCC remote control settings" for more information regarding the different user levels.

6.3. BASIC SETTINGS {8000}

The parameters for a basic setup of the MPPT TriStar are found in this menu.

6.3.1. Address of the MPPT selected to be on the display {8014}

On the RCC-02/-03 display, illustrated in figure 5.1, it is possible to show the combined values of all solar charge controllers but also the values of one specific device. This parameter is used to select the RS-485 identifier of the specific solar charge controller which values will be shown on the display.

6.3.2. Charge cycles synchronization activated {8001}

When this parameter is set to "Yes", the solar charge controllers are driven by the Xcom-MS to follow the same charge cycle as the inverter-charger(s) (see section 5.2).

When activating this parameter {8001}, it is essential to check that the Xtender parameter {1158} "End of absorption triggered with current" is set to "No". This in order to achieve an optimal battery charge curve.

6.3.3. Change the RS-485 identifier {8002}

This parameter is used to change the RS-485 identifier of a solar charge controller single connected on the RS-485 bus. The procedure is described in section 4.4.

If several solar charge controllers are connected on the RS-485 bus during the change of this parameter, they will all be assigned the same address. This will lead to collisions during operation putting the communication bus out of order. A reassignement of the addresses will solve this problem.

6.3.4. Restore default settings {8015}

Use this parameter to restore the initial settings of the Xcom-MS.

If your installer has changed some settings at "installer" level while commissioning your installation, this function restores his settings and not the default factory settings.

6.3.5. Restore factory settings {8016}

This feature restores all factory settings, including the factory values, restrictions and user levels. This paramenter is only accessible at "installer" level.

6.4. BATTERY MANAGEMENT WITHOUT SYNCHRONIZATION {8003}

This menu contains a parameter set for the battery cycle, which is copied to the solar charge controllers as described in section 5.2. Further information on these parameters can be found in the solar charge controller documents.

6.4.1. Battery floating level {8004}

Floating voltage of the solar charge controllers.

6.4.2. Maximum delay in floating {8005}

Time below floating voltage to restart a new cycle.

6.4.3. Battery voltage level to start a new cycle {8006}

The voltage level to reach in order to start a new cycle.

6.4.4. Battery absorption voltage {8009}

Voltage value for the absorption cycle.

6.4.5. Absorption time {8010}

Duration of the absorption phase.

6.4.6. Battery temperature compensation {8011}

A factor used to correct the battery cycle voltage. Each solar charge controller should be provided with an individual battery sensor.

6.4.7. Equalization allowed {8017}

This parameter is used to define if the equalization phase is allowed.

6.4.8. Equalization voltage {8018}

Equalization voltage.

6.4.9. Equalization time {8019}

Time during which the equalization voltage is maintained.

6.4.10. Equalization interval {8020}

Number of days in between two equalization phases.

6.4.11. Equalization timeout {8021}

Maximal time spent above absorbation voltage attempting an equalization.

7. Troubleshooting

To ensure a smooth running of the system it is important to set it up in accordance with the installation manuals from Studer Innotec SA and MorningStar. If at commissioning the system is not operational, please check your installation's compliance with the requirements stated in the manuals mentionned above.

If your system still isn't working, please check the following points:

1. Check the position of the programmation switches on the MPPT TriStar solar charge controllers. The switches 4, 5 and 6 should be set to "ON".
2. Check that the software update of the Xtender system was carried out in accordance with the official procedure. The latest software version of your installation is available on the SD card delivered with the Xcom-MS or can be downloaded from our website: http://www.studer-innotec.com.
3. Check the wiring and that the communication cable RS-485 is correctly inserted in the connection compartment.
4. Check that the address assignement procedure described in section 4.4 has been followed.
5. Check that the battery voltage is visible on the TriStar solar charge controller terminals.
6. The TriStar solar charge controller can function without connection to the Xcom-MS. When the RS-485 connector is disconnected, the TriStar solar charge controller will stop automatically. It has to be disconnected from the battery and then reconnected in order to function in autonomous mode. On the contrary, only one solar charge controller without battery connection will put the RS-485 bus out of order.
7. If the Xtender installation is disconnected (for example by disconnecting the communication cable) or shut off, the TriStar solar charge controller will automatically return to an independant mode and will continue to charge and maintain the battery.
8. When the synchronisation is activated {8001}, the TriStar's green LED is normally flashing once every second (as when it is in independent absorption mode). With the synchronisation activated, it is also possible to indicate the charge phase in one of the two battery information fields on the RCC-02/-03 remote control's Xtender screen.

8. Factory setting values

				12 V			24 V			48 V			
Level	**User ref.**	**Parameter**	**Unit**	**Factory**	**Min**	**Max**	**Factory**	**Min**	**Max**	**Factory**	**Min**	**Max**	
Basic	8000	BASIC SETTINGS											
Expert	8014	Address of the MPPT selected for the display		1	0	30	1	0	30	1	0	30	
Basic	8001	Charge cycles synchronization activated	No/Yes	No	No	Yes	No	No	Yes	No	No	Yes	
Expert	8002	Change the RS-485 identifier		0	0	30	0	0	30	0	0	30	
Basic	8015	Restore default settings		S	S	S	S	S	S	S	S	S	
Inst.	8016	Restore factory settings		S	S	S	S	S	S	S	S	S	
Basic	8003	BATTERY MANANGEMENT WITHOUT SYNCHRONIZATION											
Basic	8004	Battery floating level	Vdc	13.6	9.5	18	27.2	19	36	54.5	37.9	72	
Basic	8005	Maximum delay in floating	hours	2	.2	18	2	.2	18	2	.2	18	
Basic	8006	Battery voltage level to start a new cycle	Vdc	12.5	9.5	18	25	19	36	49.9	37.9	72	
Basic	8009	Battery absorption voltage	Vdc	14.4	9.5	18	28.8	19	36	57.6	37.9	72	
Basic	8010	Absorption duration	hours	2	.2	18	2	.2	18	2	.2	18	
Basic	8011	Battery temperature compensation	mV/°C/cell	-5	-8	0	-5	-8	0	-5	-8	0	
Basic	8017	Equalization allowed	No/Yes	No	No	Yes	No	No	Yes	No	No	Yes	
Basic	8018	Equalization voltage	Vdc	15.1	13	18	30.2	26	36	60.5	52.1	72	
Basic	8019	Equalization duration	hours	1	.2	10	1	.2	10	1	.2	10	
Basic	8020	Equalization interval	days	28	1	365	28	1	365	28	1	365	
Basic	8021	Equalization timeout	hours	3	1	50	3	1	50	3	1	50	

Table 8.1. Factory setting values

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